Claims

What is claimed is:

1. A catalyst composite comprising:

an extruded catalyst support comprising an extruded activated carbonaceous material having pores and wherein at least about 40% of total Hg porosity occurs in pores having a diameter of about 200 Å and larger; and

a precious metal catalyst.

2. A catalyst composite comprising:

an extruded catalyst support comprising an extruded activated carbonaceous material having pores and wherein at least about 38% of total Hg porosity occurs in pores having a diameter of about 1,000 Å and larger; and

a precious metal catalyst.

3. A catalyst composite comprising:

an extruded catalyst support comprising an extruded activated carbonaceous material having pores and wherein at least about 34% of total Hg porosity occurs in pores having a diameter of about 5,000 Å and larger; and

a precious metal catalyst.

4. The catalyst composite according to claim 3, wherein the catalyst composite comprises about 70% by weight or more and about 99.99% by weight or less of the extruded catalyst support and about 0.01% by weight or more and about 30% by weight or less of the precious metal catalyst.

5. A catalyst composite comprising:

an extruded activated carbonaceous material comprising a first set of pores having a pore diameter of at least about 40 Å and at most about 100 Å with a porosity of at least about 0.15 cc/g, and a second set of pores having a

pore diameter of at least about 5,000 Å and at most about 20,000 Å with a porosity of at least about 0.3 cc/g; and

a precious metal catalyst.

6. The catalyst composite according to claim 5, wherein at least about 40% of total Hg porosity occurs in a third set of pores having a diameter of about 200 Å and larger in the extruded activated carbonaceous material.

7. The catalyst composite according to claim 5, wherein the catalyst composite comprises about 70% by weight or more and about 99.99% by weight or less of the extruded activated carbonaceous material and about 0.01% by weight or more and about 30% by weight or less of the precious metal catalyst.

8. The catalyst composite according to claim 5, wherein the catalyst composite is at least one of a hydrogenation catalyst composite, a rearrangement catalyst composite, a purification catalyst composite, a dehydration catalyst composite, a dehydrogenation catalyst composite, an oxidation catalyst composite, a reduction catalyst composite, a polymerization catalyst composite, a dehydrocylcization catalyst composite, a reforming catalyst composite, a hydrocracking catalyst composite, and an isomerization catalyst composite.

9. The catalyst composite according to claim 5, wherein the precious metal catalyst comprises at least one selected from the group of platinum, platinum and rhenium, platinum and ruthenium, platinum and tungsten, platinum and nickel, platinum and tin, platinum and iron, platinum and copper, platinum and rhodium, platinum and lead, platinum and germanium, palladium, palladium and rhenium, platinum and gold, platinum and tellurium, palladium and gold, palladium and indium, palladium and sulfur, palladium and tellurium, palladium

and rhodium, palladium and tungsten, palladium and nickel, palladium and tin, palladium and copper, palladium and ruthenium, palladium and lead, palladium and germanium, cobalt, rhodium, ruthenium, osmium, and iridium.

10. The catalyst composite according to claim 5, wherein the extruded activated carbonaceous material comprises a first set of pores having a pore diameter of at least about 40 Å and at most about 100 Å with a porosity of at least about 0.2 cc/g, and a second set of pores having a pore diameter of at least about 5,000 Å and at most about 20,000 Å with a porosity of at least about 0.4 cc/g

11. The catalyst composite according to claim 5, wherein at least about 38% of total Hg porosity occurs in a third set of pores having a diameter of about 1,000 Å and larger in the extruded activated carbonaceous material.

12. A method of making a catalyst composite:

mixing at least one carbonaceous material and a liquid to form a mixture;

extruding the mixture into a shaped material;

optionally drying the shaped material;

heat treating the shaped material at a temperature from about 600°C to about 1,500°C to provide a catalyst support, wherein the catalyst support has at least about 40% of total Hg porosity in pores having a diameter of about 200 Å and larger; and

contacting a precious metal catalyst with the catalyst support.

13. The method according to claim 12, wherein the catalyst support comprises a set of pores having a pore diameter of at least about 40 Å and at most about 100 Å with a porosity of at least about 0.15 cc/g, and another set of

pores having a pore diameter of at least about 5,000 Å and at most about 20,000 Å with a porosity of at least about 0.3 cc/g

14. The method according to claim 12, wherein the shaped material is in the form of one or more from the group consisting of spheres, tablets, cylinders, stars, tri-lobes, quadra-lobes, pellets, granules, honeycombs, and cubes.

15. The method according to claim 12, wherein the shaped material comprises less than about 3% by weight free moisture.

16. The method according to claim 12, wherein mixing is conducted for a time of about 5 minutes or more and about 100 minutes or less and the shaped material is heat treated at a temperature from about 700°C to about 1,000°C.

17. A method of purifying a crude polycarboxylic aromatic acid composition, comprising:

contacting the crude polycarboxylic aromatic acid composition with a catalyst composite comprising

an extruded activated carbonaceous material comprising a first set of pores having a pore diameter of at least about 40 Å and at most about 100 Å with a porosity of at least about 0.15 cc/g, and a second set of pores having a pore diameter of at least about 5,000 Å and at most about 20,000 Å with a porosity of at least about 0.3 cc/g; and

a metal catalyst.

18. The method according to claim 17, wherein the crude polycarboxylic aromatic acid composition comprises terephthalic acid, isophthalic

acid and 2,6-naphthalene dicarboxylic acid.

19. The method according to claim 17, wherein the crude polycarboxylic aromatic acid composition comprises terephthalic acid and at least one of undesirable coloring components and 4-carboxy benzaldehyde.

20. The method according to claim 17, wherein the crude polycarboxylic aromatic acid composition is contacted with the catalyst composite at a temperature from about 100°C to about 350°C under a pressure from about 150 psig to about 1,600 psig.

21. A method of purifying a crude polycarboxylic aromatic acid composition, comprising:

contacting the crude polycarboxylic aromatic acid composition with a catalyst composite comprising

an extruded activated carbonaceous material having pores and wherein at least about 40% of total Hg porosity occurs in pores having a diameter of about 200 Å and larger; and

a metal catalyst.

22. The method according to claim 21, wherein the crude polycarboxylic aromatic acid composition comprises terephthalic acid, isophthalic acid and 2,6-naphthalene dicarboxylic acid.

23. The method according to claim 21, wherein the crude polycarboxylic aromatic acid composition comprises terephthalic acid and at least one of undesirable coloring components and 4-carboxy benzaldehyde.

24. The method according to claim 21, wherein the crude

polycarboxylic aromatic acid composition is contacted with the catalyst composite at a temperature from about 100°C to about 350°C under a pressure from about 150 psig to about 1,600 psig.

25. The method according to claim 21, wherein at least about 34% of total Hg porosity occurs in pores having a diameter of about 5,000 Å and larger in the extruded activated carbonaceous material.

26. A method of purifying a crude amine composition or a crude alkynol amine composition, comprising:

contacting the crude amine composition or the crude alkynol amine composition with a catalyst composite comprising a catalyst support comprising

an extruded activated carbonaceous material comprising a first set of pores having a pore diameter of at least about 40 Å and at most about 100 Å with a porosity of at least about 0.15 cc/g, and a second set of pores having a pore diameter of at least about 5,000 Å and at most about 20,000 Å with a porosity of at least about 0.3 cc/g; and

a metal catalyst.

27. The method according to claim 26, wherein the crude amine composition or the crude alkynol amine composition comprises a crude aromatic amine composition, a crude aromatic alkynol amine composition, a crude aliphatic amine composition, or a crude aliphatic alkynol amine composition.

28. The method according to claim 26, wherein at least about 38% of total Hg porosity occurs in a third set of pores having a diameter of about 1,000 Å and larger in the extruded activated carbonaceous material.